

Claims

1. A device for a motor vehicle having a support structure adapted to be mounted in the vehicle (1) and a steering wheel (21),
5 which is rotatably connected to the support structure, wherein the device includes
a control unit (31),
a sensor device (32), which is connected to the control unit (31),
wherein the sensor device is adapted to sense vibrations in the
10 steering wheel and to provide a sensor signal related to the sensed vibrations, and
an actuator device (34), which is connected to the control unit (31)
and adapted to influence the vibrations in the vehicle (1),
characterised in that the control unit (31) is adapted to control the
15 actuator device (34), with regard to the sensor signal, to act on the vehicle (1) in such a way that a desired vibration character in the steering wheel (21) is obtained.
2. A device according to claim 1, characterised in that the device
20 includes a reference sensor (33) which is connected to the control unit (31) and adapted to sense vibrations outside the support structure for providing a reference signal to the control unit (31).
3. A device according to claim 2, characterised in that the
25 reference sensor (33) includes a first reference sensor element (43) arranged to sense engine-excited vibrations and a second reference sensor element (43) arranged to sense road-excited vibrations.
4. A device according to anyone of claims 1 to 3, characterised
30 in that the sensor device (32) includes at least one sensor element (42) adapted to be mounted on the steering wheel (21).
5. A device according to claim 4, characterised in that the sensor
35 device (32) includes at least a further sensor element (42) adapted to be mounted on the support structure.

6. A device according to anyone of the preceding claim, characterised in that the actuator device (34) includes at least one actuating element (44) adapted to be mounted and act on the support structure.

5

7. A device according to claim 6, characterised in that the support structure includes a support beam (20) extending in an axial direction (A) transversally to a longitudinal driving direction (P) of the vehicle (1), wherein the actuator device (34) includes at least 10 one actuating element (44) adapted to be mounted and act on the support beam (20).

8. A device according to claims 4 and 7 characterised in that said further sensor element (42) is adapted to be mounted on the 15 support beam (20).

9. A device according to anyone of claims 7 and 8, characterised in that the support beam (20) has a periphery, wherein the actuator device (34) includes at least two actuating elements (44) which are 20 adapted to be mounted around the periphery with an angle distance between each other.

10. A device according to claim 9, characterised in that the actuating elements (44) are uniformly distributed around the 25 periphery.

11. A device according to anyone of claims 9 and 10, characterised in that the actuating elements (44) are provided at substantially the same axial position.

30

12. A device according to anyone of claims 7 to 11, characterised in that the actuator device (34) is adapted to introduce a bending moment to the support beam (20).

35

13. A device according to anyone of the preceding claims, characterised in that the steering wheel (21) is connected to a steering column (22), wherein the actuator device (34) includes at

least one actuating element (44) adapted to be mounted and act on the steering column (22).

14. A device according to claim 13, characterised in that the actuator device (34) is adapted to introduce a bending moment to the steering column (22).

15. A device according to anyone of the preceding claims, characterised in that the control unit (31) includes an adaptive filter (51) which is adapted to generate an actuating signal supplied to the actuator device (34) for said influence on the vibrations in the vehicle (1).

16. A device according to claims 2 and 15, characterised in that the reference sensor (33) is connected to the adaptive filter (51) and arranged to supply the reference signal to the adaptive filter (51), wherein the reference signal forms the basis for the actuating signal.

17. A device according to anyone of the claims 15 and 16, characterised in that the sensor device (32) is arranged to supply the sensor signal to the adaptive filter (51) for updating the adaptive filter.

18. A device according to anyone of claims 15 to 17, characterised in that the control unit (31) includes a prefilter (53), which is connected to the reference sensor (33) and arranged to provide a filtered reference signal.

19. A device according to anyone of claims 15 to 18, characterised in that the control unit (31) includes a control algorithm (54), which is located between the sensor device (32) and the adapted filter (51) and arranged to filter the sensor signal supplied to the adaptive filter (51).

20. A device according to claims 18 and 19, characterised in that the prefilter (53) is connected to this control algorithm (54) for the supply of the filtered reference signal to the control algorithm.

5 21. A device for a motor vehicle, including
 a support structure adapted to be mounted in the vehicle,
 a steering wheel (21) rotatably connected to the support structure,
 a control unit (31),
 a sensor device (32), which is connected to the control unit (31),
10 wherein the sensor device is adapted to sense vibrations in the
 steering wheel and to provide a sensor signal related to the sensed
 vibrations, and
 an actuator device (34), which is connected to the control unit (31)
 and adapted to influence vibrations in the vehicle (1),
15 characterised in that the control unit (31) is adapted to control the
 actuator device (32), with regard to the sensor signal, to act on the
 vehicle (1) in such a way that a desired vibration character in the
 steering wheel (21) is obtained.

20 22. Motor vehicle including a support structure mounted in the
 vehicle (1), a steering wheel (21), which is rotatably connected to
 the support structure, and a device, wherein the device includes
 a control unit (31),
 a sensor device (32), which is connected to the control unit (31),
25 wherein the sensor device (32) is adapted to sense vibrations in the
 steering wheel and to provide a sensor signal related to the sensed
 vibrations, and
 an actuator device (34), which is connected to the control unit (31)
 and adapted to influence vibrations in the vehicle (1),
30 characterised in that the control unit (31) is adapted to control the
 actuator device (34), with regard to the sensor signal, to act on the
 vehicle (1) in such a way that a desired vibration character in the
 steering wheel (21) is obtained.